THE WESTERN GAS CONSTRUCTION CO.

GAS ENGINEERS AND BUILDERS

SAN FRANCISCO FORT WAYNE, IND. NEW YORK

Bulletin No. 220.

AT THE

LOUISIANA PURCHASE EXPOSITION, ST. LOUIS, 1904.

THE

GRAND PRIZE

WAS

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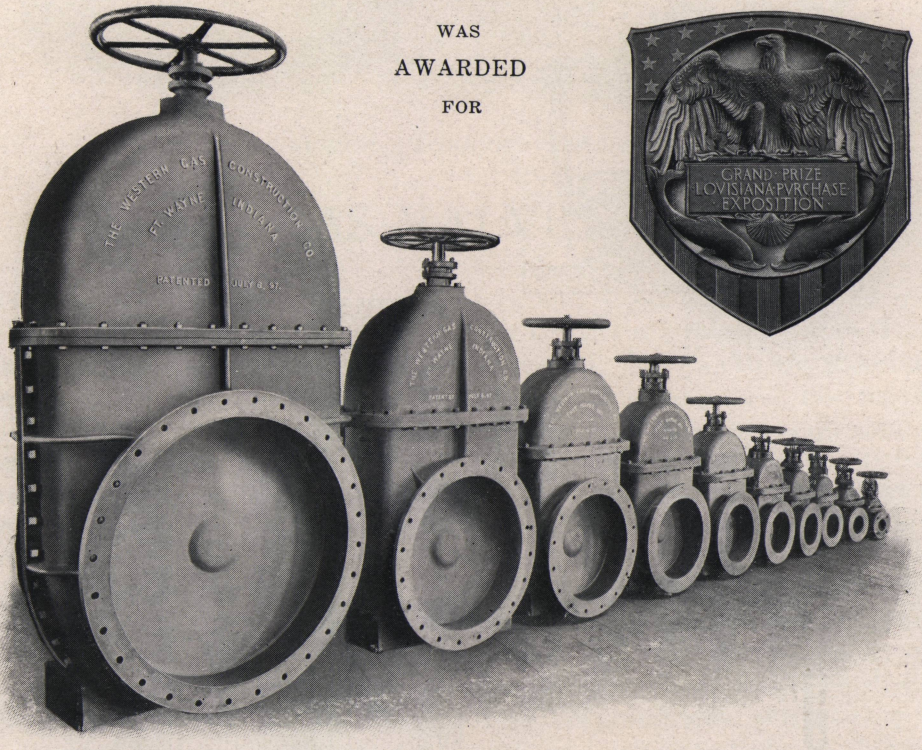


"THE WESTERN" GAS VALVES

BUILT ONLY BY

THE WESTERN GAS CONSTRUCTION CO.

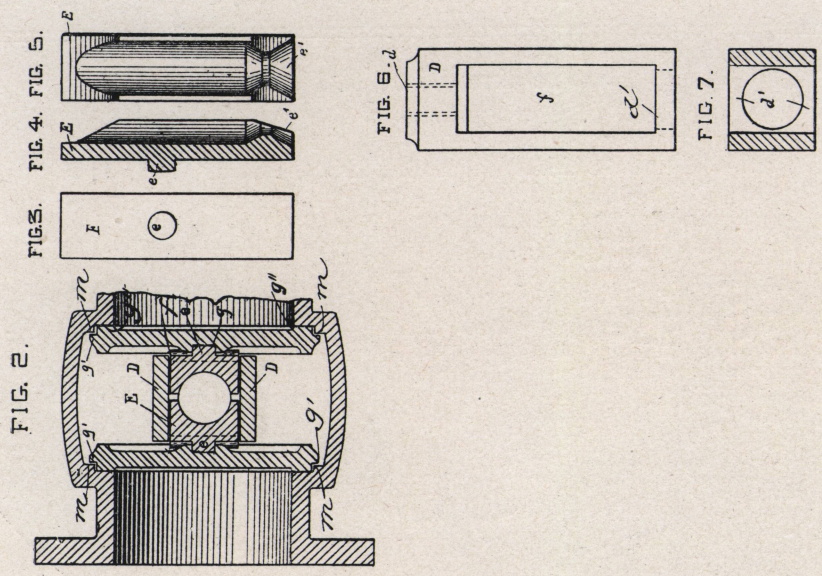
FORT WAYNE, INDIANA.

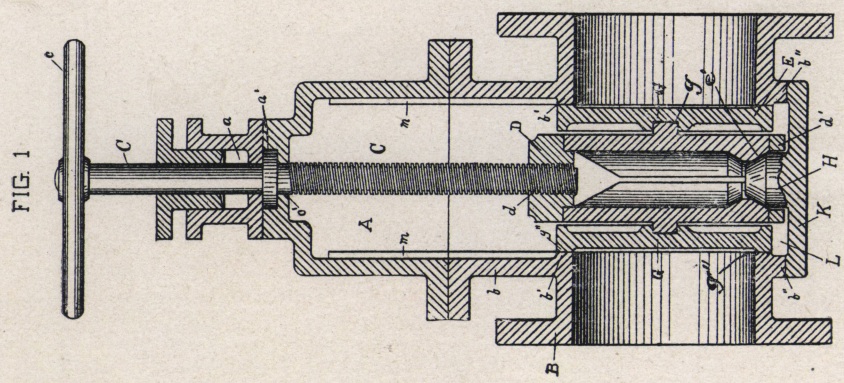
(No Model.) 2 Sheets—Sheet 1.

O. N. GULDLIN.

GATE VALVE.

No. 585,912. Patented July 6, 1897.





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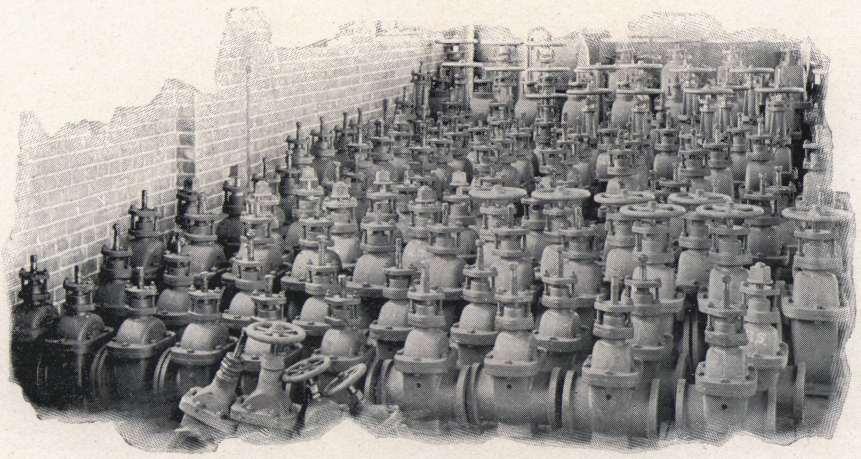


OUR ORIGINAL "CORNER" IN VALVES.

GAS VALVES.

Practically all of the valves used in and about a gas works and its distributing system may be classed under four general heads, namely Gate valves, in which the gate or disc moves in a direction at right angles to the direction of the axis of its seat; Angle and Ball valves, in which the gate or disc moves in a line with the axis of its seat; Rotary valves, in which the gas passage is changed by the rotary motion of a portion of the valve as in case of Center-seals and Four-way valves such as are used for purifiers; and lastly Hydraulic valves, which are closed by the immersion of some part of the valve in a liquid as water, oil or mercury.

The "Western Gas" gate valves are of the double gate pattern with parallel seats so that the locking device does not depend upon forcing the gate between the inclined seats, but is closed by two independent discs which slide to their position opposite to the seats and are then locked by direct pressure against them. That these valves are eminently satisfactory is well attested not only by their reputation in America but also in Europe where they are extensively used. The principle of the design of the "Western Gas" valve is very clearly shown in Figs. Nos. 1 to 7 incl., which is a facsimile of the patent drawing showing date of same.

Our valves are made on the interchangable plan, so that as we carry a large stock of parts on hand to make up any particular style, it is simply a matter of assembling them and testing. Most of the parts are made on special machinery as indicated by the small illustrations. (See Features of "The Western" Gate Valves, Page 14.)

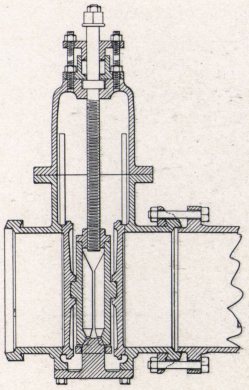


Fig. 8.

Double gate valves are made up in various styles, referring particularly to the style of body, whether made with flanges, hubs, or universal bells (Fig. 8) and also special valves for district testing (Fig. 9) in which there is tapped into each side of the top a small pipe connection outside of the gate so that the valve can be closed and a meter or pressure gauge connected between the two small pipes. In many places where lead joints are used it is advisable to use a flange valve, having bolted to each flange a flanged hub piece connecting to the spigot pipes, but permitting removal of the valve without breaking or cutting the pipe. The same valves may be used in connection with threaded pipe by simply bolting a threaded flange on to each flange of the valve body, as shown in Fig. 10.

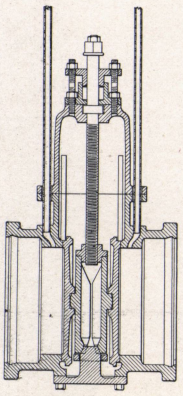


Fig. 9.

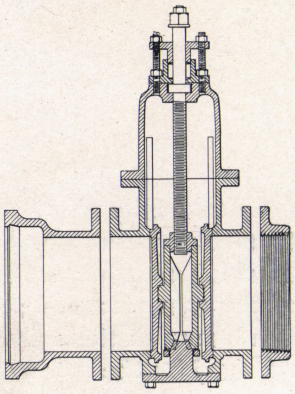


Fig. 10.

The mechanism for operating the gate is the same in all inside screw valves, and for outside screw valves it is simply changed by making the nut of the valve spindle fast into the yoke and having thread and nut outside of the valve stuffing box. The inside screw valves are made in two classes, namely, Single Screw and Compound Screw.

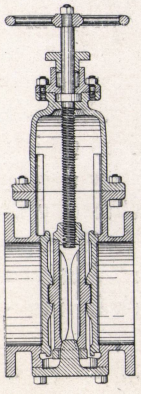


Fig. 11.

The single screw valves have the screw made with fixed collar, only the top end is secured under the stuffing box, as illustrated in figure No. 11. The upper end of the yoke is threaded for the screw and travels up and down on the valve spindle inside the case, as shown in figure No. 12. The single screw valve with nut head for street main work is shown in figure No. 13; such valves being almost always made with hubs on both sides for receiving the spigot ends of the street pipes. These valves are also made for flanged connections then a hand wheel substituted for

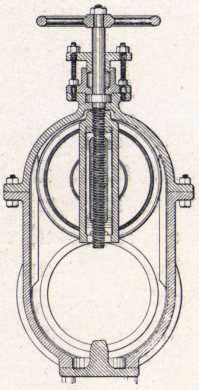


Fig. 12.

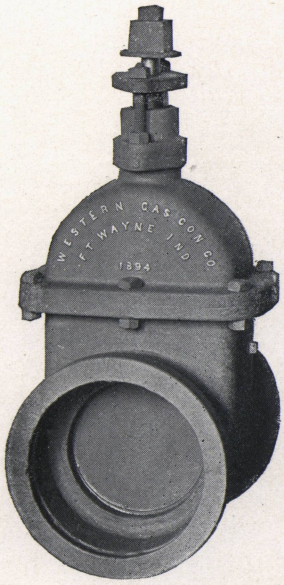


Fig. 13.

the nut and also provided with cleaning hand holes on the side of valve close to the bottom, as shown in figure No. 14. Figure No. 15 illustrates both styles in somewhat different sizes. Occasionally with large valves it is desirable to have them set horizontally, in which case it is often required to have the hand wheel stem stand vertically, in which case they are provided with an internal bevel gear and side hand wheel as shown in Figure No. 16. In the case of very large valves, as for instance

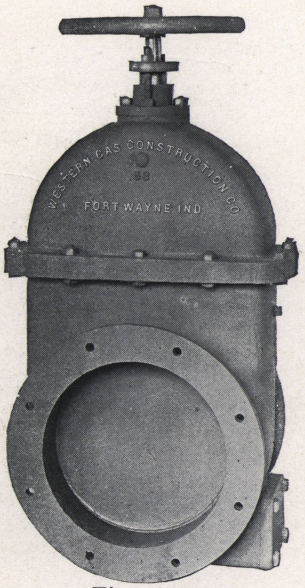


Fig. 14.

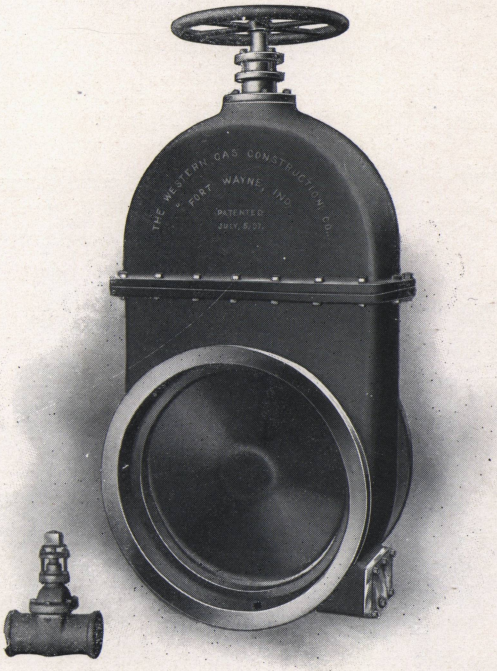


Fig. 15.

48 to 60 inches, it sometimes is desirable to have the stems geared by placing a spur gear in place of the hand wheel and arranging the hand wheel with pinion to mesh into the spur gear but this is only necessary on the largest and heaviest valves, for, with our design and construction the power required to operate the valves is extremely small, as demonstrated by our 42 inch valves among those which received the Grand Prize at St. Louis, which 42 inch valves easily operated and tightly closed, and as easily opened when resting in horizontal position with load of over eight tons dead weight resting on the top flange When using the geared hand wheel on the very large valves they are some times arranged with bevel gears so that the hand wheel spindle will stand out horizontally for convenience in getting at the hand wheel in case where it would other wise be necessary to build a platform These are illustrated by Figures No. 17 and No. 18.

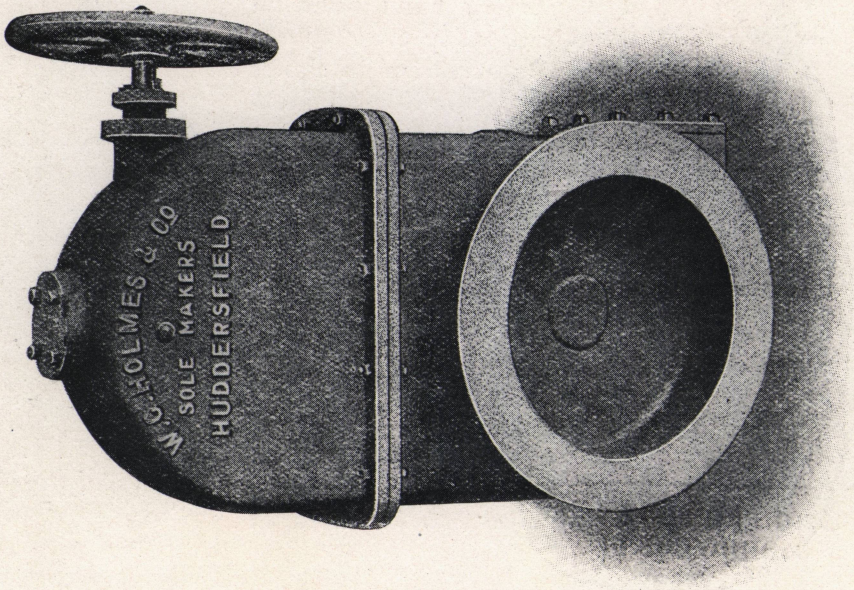


Fig. 16.

Fig. 16 shows one of our valves with side hand wheel as built by our English Representatives, Messrs. W. C. Holmes & Co., of Huddersfield, England.

When it is desirable to have a valve in which the movement of the gates shall be quite rapid, a compound screw valve is used as illustrated in Figure 19, showing section of such valve. In this the valve stem rises with hand wheel through the height equal to one-half the travel of the gates. Figure 20 is an outside illustration of the compound screw valve closed. In the outside screw valve a yoke is provided as illustrated in Figure 21. When the outside portion of the valve stem bearing the screw travels up through the hub of

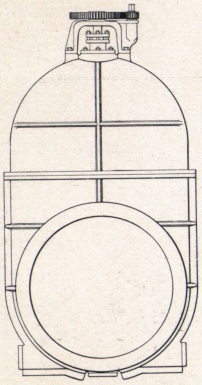


Fig. 17.

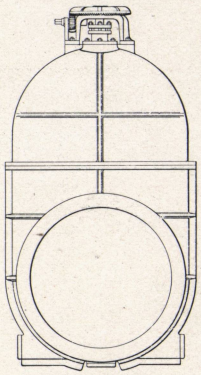


Fig. 18.

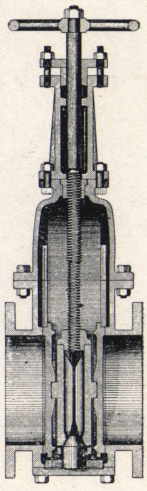


Fig 19.

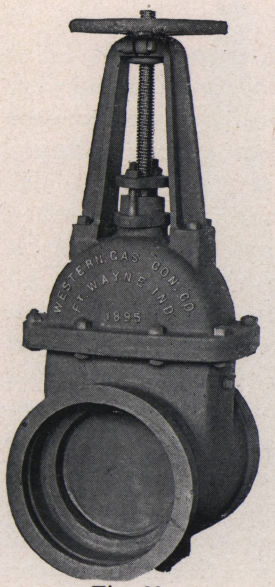


Fig. 20.

the hand wheel, which forms a nut. Figures 22 and 23 give sectional and outside views of an outside screw valve with protecting sleeve covering the screw of the valve when closed. Outside screw valves when used with floor stands are often provided with telescoping screws in which the construction is similar to the valve shown in Figure 22, excepting that the nut is at the bottom of the sleeve instead of the top, but this form is only used with the floor stand, as the distance between the nut and stuffing box must be equal to the full length of the screw. The largest size of outside screw valves may be made with geared hand wheel, with gearing similar to that shown in Figures 17 and 18. We also manufacture quick opening valves for special purposes, such as blast valves on water gas apparatus, the usual style being illustrated by Figure 24. The valve is opened by simply raising the lever and gates held at any point by the pawl shown on neck of valve, and which engages ratchet teeth on side of valve stem.

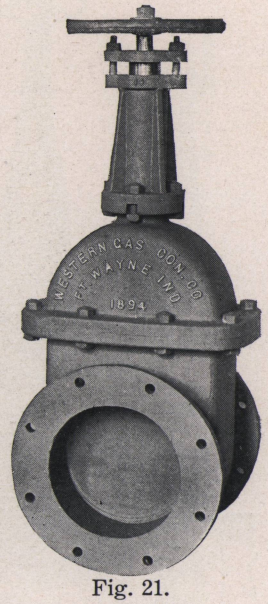


Fig. 21.

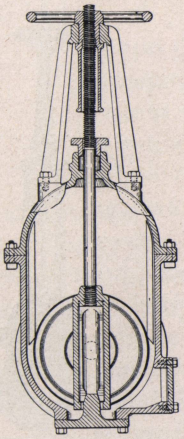


Fig. 22.

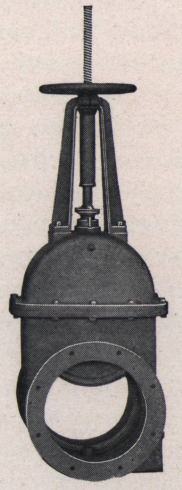


Fig. 23.

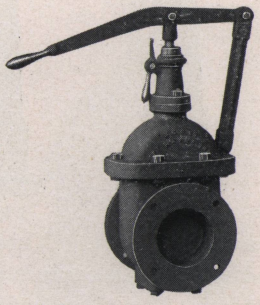


Fig. 24.

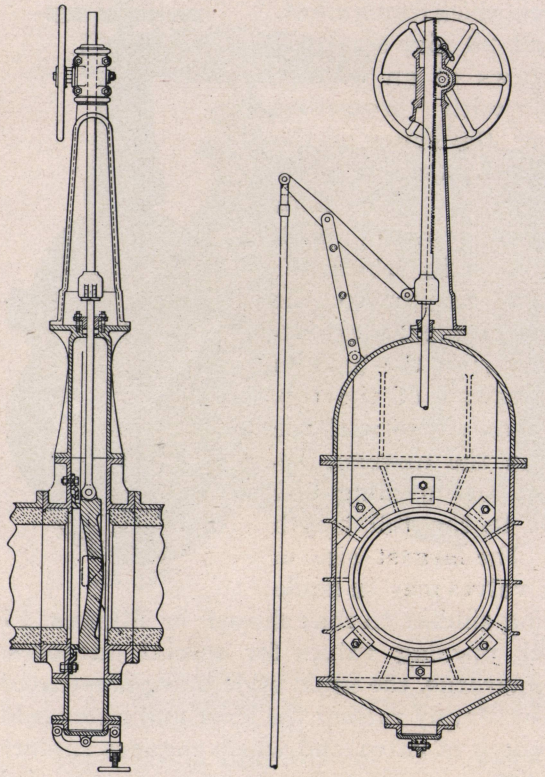


Fig. 25.

For Hot Gas several styles of gate valves are made, some with water cooled or steamcooled seats or bodies, but for ordinary conditions, such as at the off-take of a water gas generator experience has proven that a simple removable seat meets all requirements if the valve as a whole is properly designed, and the water cooling is a matter of visionary rather than real advantage, and in fact the nuisance of a leaky water chamber in a valve that has been cracked by abuse, is more of a trouble than is liable to happen with a simple removable seat ring. We illustrate in Figure 25 and a valve which answers all requirements with the least care required.

Fig. 26.

Fig. 27.

In almost all cases where the valves are located beneath operating floor, it is desirable to have the floor stand with hand wheel at proper height for convenient operation and in the case of inside screw valves this is accomplished by simply extending the stem of the valve through the floor stand, having hand wheel on top as shown in Figure 26. Fig. 27 shows some floor stands with mouldings on upper end polished, and with the polished floor stand and handwheel also is turned and polished. When the floor stands are furnished with the valves, distance braces are provided, extending from the cap of valve body to the floor level and form rigid legs upon which the floor stand is

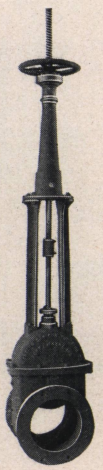


Fig. 28.

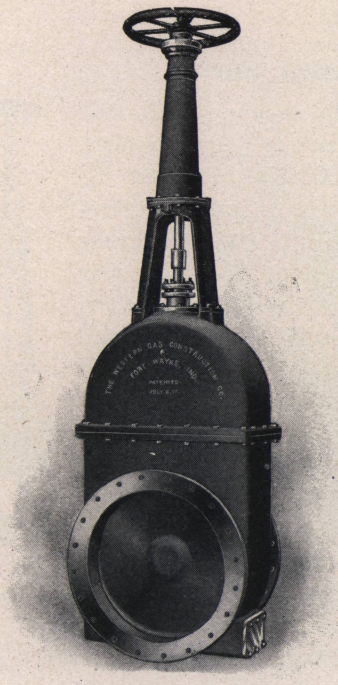


Fig. 29.

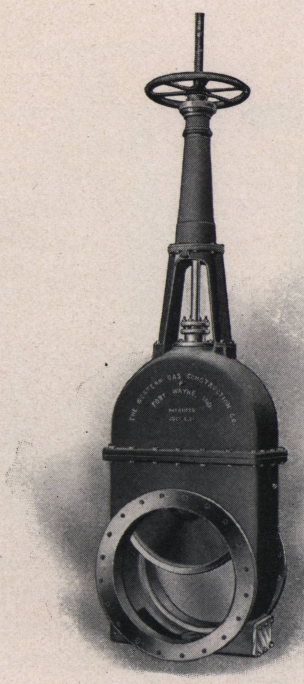


Fig. 30.

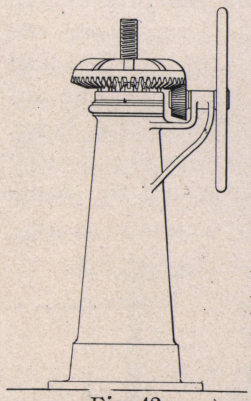


Fig. 42.

mounted so that the whole combination is independent of the floor, and therefore unaffected by any settlement of the floor or change of position due to warping and springing of same. Figure 28 illustrates such distance braces and figures 29 and 30 also illustrates distance braces as used when the valve is nearer the floor. In the case of very large valves, the gearing, as shown in figures 17 and 18 are applied to the floor stand as shown in Figure 31. In the case of an inside screw valve where the stem does not rise on opening the valve, an indicator stand may be provided as illustrated in Figure 32, and a screw thread on the stem inside of valve stand including nut with pointer to travel up and down on the scale, indicating at all times the exact position of the gate. In this illustration the distance braces are not shown, although always provided. Figure 33 shows another style in which the valve body comes quite close to the floor stand. Still another style of hidden screw floor stand is illustrated in Figure 34, which is another form of teliscopic stand, in

Fig. 32.

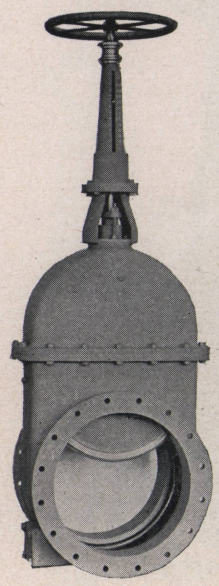


Fig 33.

which the valve has an outside screw, with nut in lower end of sleeve operating by hand wheel. This style of valve is particularly adapted to purifier plants, in which case an indicator is provided at the top of valve, and show whether valve is open or shut, the indicator rising a few inches above the top of hand wheel when the valve is open. We also build many special styles of floor stands, Figure 35 showing one for quick opening valves, such as usually used on water gas apparatus, Figure 36 shows a rack and pinion floor stand, also used principally on water gas apparatus, and Figure 37 shows still another style of rack and pinion floor stand such as used for combinations of valves in which one valve is opened by the same operation that closes another. This is also most often used on water gas apparatus.

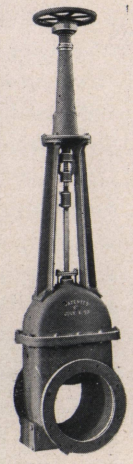


Fig. 34.

In the case of unusually large or heavy valves, where quick operation is desirable, hydraulic attachments are provided as shown in Figure 38. In this style of operating gear, the length of the stroke in hydraulic cylinder is equal to the travel of the gates and the diameter of cylinder proportioned to the load to be lifted and water pressure available. When located above the floor, the hydraulic attachment is operated by a simple valve, and when located below the floor, or desirable to be operated from a distance, the controlling valve is mounted on or beneath the floor stand, with indicator hand wheel by which the main valve can be easily controlled.

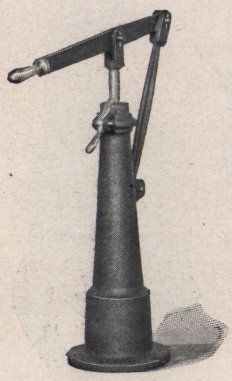


Fig. 35.

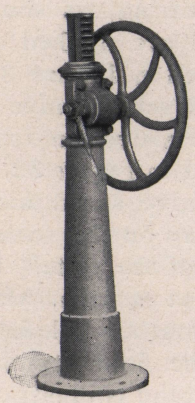


Fig. 36.

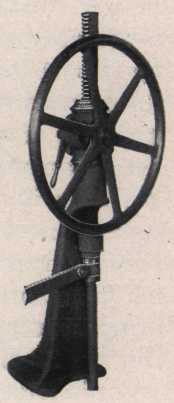


Fig. 37.

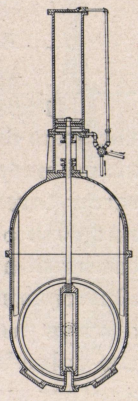


Fig. 38.

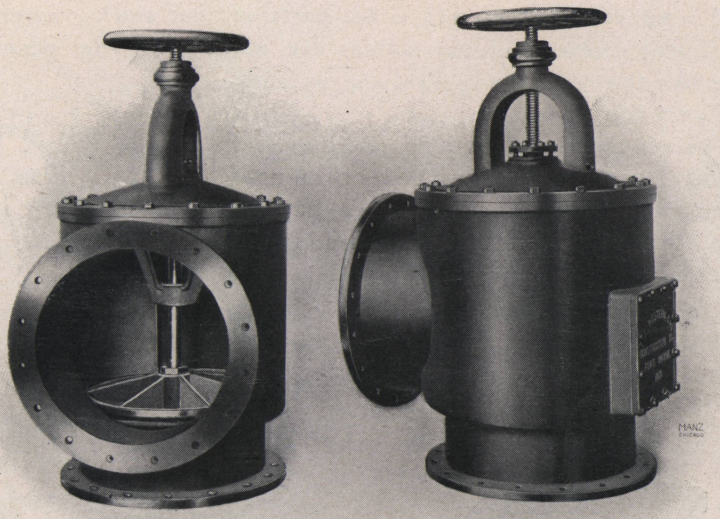


Fig. 50.

ANGLE VALVES.

There are several types of angle valves which we manufacture, they being of a class in which the disc or gate valve moves in line with the axis of the pipe. Such valves are generally used as a most convenient substitute for a gate valve and an elbow by combining the two in one. They are particularly adaptable for such places as inlet and outlets of exhausters and other gas apparatus where elbows are required. Our regular pattern is of the outside screw type, with nut fixed on head of yoke, and hand wheel fixed on head of screw.

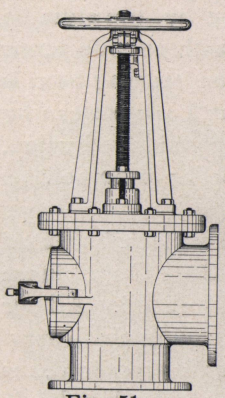


Fig. 51.

Figure 50 shows style of a large angle valve, which general style is maintained through all sizes, The gate is hung loose on the stem so that the gate can adjust itself to the seat perfectly whether the valve stands vertically, horizontally, or in any other position. For heavy work these valves are also made with the same style of outside screw as used on gate valves, such valves being illustrated by figure 51.

In case where it is specially necessary that the valve be absolutely tight under all circumstances, regardless of any dirt or any other matter that may come along, a mercury seal valve may be used, such a one being illustrated by figure 52.

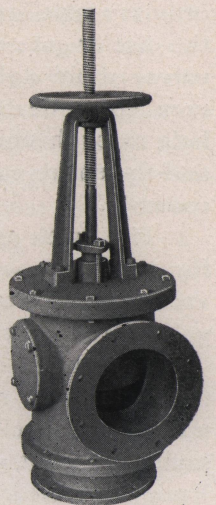


Fig. 52.

If used in exhauster room and other parts of gas works where a special finish is desirable, these murcury valves are made with the general outward appearance like the regular angle valves, as illustrated by Figure 53.

Angle valves are also very adaptable to Hot Gas work and they have for many years been used on our water gas apparatus with the very best results. The type of angle valve so used being

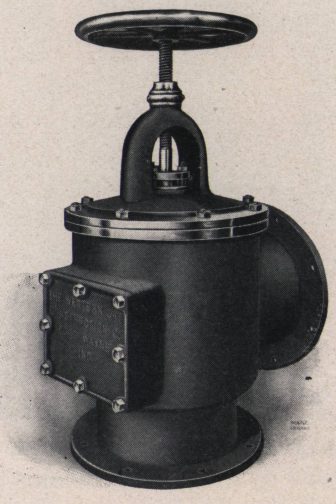


Fig. 53.

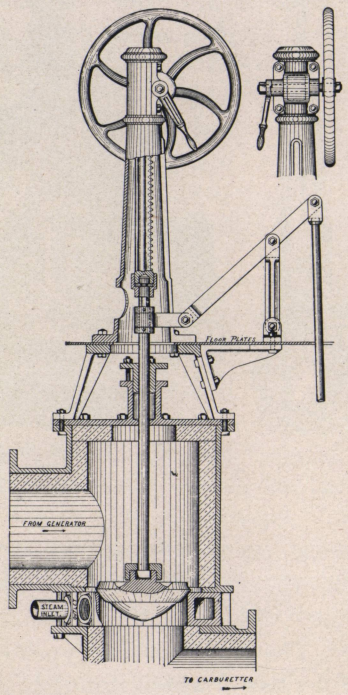


Fig. 54.

illustrated by Figure 54, which also shows the link connections for operating the second angle valve in the down run pipe generally used in connection with this valve.

As to details of design of angle valves, it is to be noted that the nut in the ordinary type is part of the yoke and therefore heavy pressure by the stem on the disc or gate cannot tear it loose as is so often the case with outside screw valves of old style make. The yoke is of such shape that the stuffing box is very conveniently accessable, and the body of the valve has a large cleaning hole through which access may be had to the pipe connected to side of valve, and the entire valve body may be easily cleaned out without being cramped for room.

If a quick opening angle valve is desired, a lever attachment is substituted for the hand wheel, similar to the design shown in Figure 24. On all large valves the rack and pinion stand may be used, as shown in Figure 36. All our valves are very carefully made and thoroughly tested before leaving the works.

For special cases, angle valves are made with side nozzles as required, as the rectangular nozzle on the angle valves used by us on our improved multiple washers, or special nozzles for carburetter blast valves, which is practically the same thing, but with the side nozzle arranged to fit the carburetter shell and having two cleaning plates instead of one.

These valves are sometimes made for special purposes with a third nozzle on the back opposite the first side nozzle, thereby forming a Tee valve with gate to close off the side branch, as shown in Figure 55

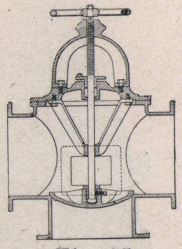


Fig. 55

In some cases it is desirable to have a Three-way valve which we make in a type very similar to the Tee valve as mentioned above, with the exception that although the body externally very closely resembles the Angle valves, the interior is arranged with a double face disc, which, when raised closes off one branch of the body, and when lowered opens that branch and closes another. Figure 56 illustrates this style of valve, which was introduced by us several years ago, and was principally used on purifier box connections; the purifier built by us at Milwaukee being equipped with a full set of 20 inch valves of this kind.

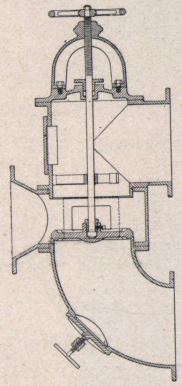


Fig. 56.

These Three-way valves are also occasionally used for other gas apparatus than purifiers, as a means of combining by-pass valve with either inlet or outlet valves, thus operating the by-pass and inlet or outlet valve at one and the same operation; but this arrangement is used only in special cases where it is desirable to prevent the by-pass valve being closed when the apparatus is out of action, because the by-pass and the other valve combined with it cannot be closed at the same time.

AUTOMATIC VALVES.

In coal gas works in connection with the exhauster, it is customary to use an automatic by-pass valve in order that if the exhauster should from any cause come to a standstill, or run too slow or because of a breakdown of the governor, or otherwise, then the gas coming from the retort will accumulate on the inlet side of the exhauster, causing the pressure there to increase, and when the pressure is increased to a point slightly in excess of the pressure on the outlet side of the exhauster, the automatic by-pass valve will open and permit the gas to pass on, same as though the exhauster were running, but with the exception that the pressure will be on the retorts until the exhauster is again put into operation. The valve remains tightly closed so long as the pressure on the outlet side is at all in excess of the pressure on the inlet side. The stuffing boxes on the stems are sealed with mercury, this making the valve practically frictionless. Pointers on the stems show at all times the position of the gates. This style of valve is illustrated by Figure 57.

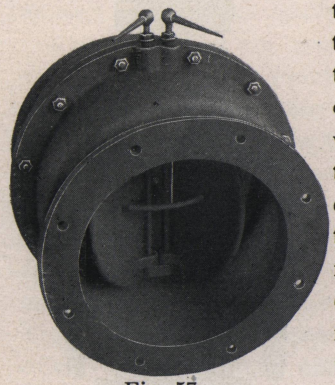


Fig. 57.

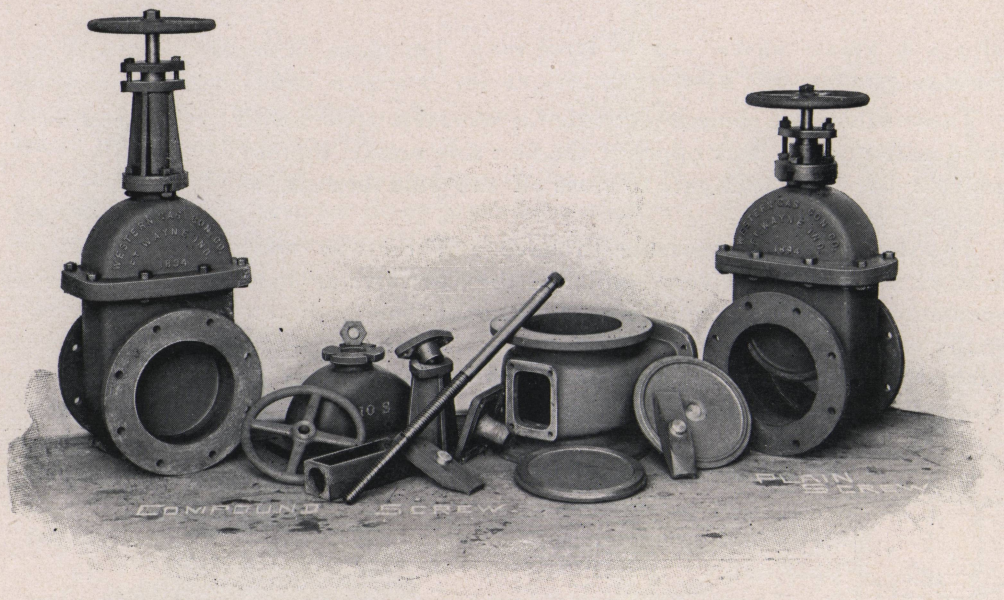


Fig. 58.

FEATURES OF "THE WESTERN" GAS GATE VALVES.

It is a well known fact that when a casting is machined and portions of the outer scale or skin removed, the casting will warp more or less according to the internal conditions as brought about by proportions of castings and conditions of moulding and pouring. This warping by the release of shrink strains, is one cause of leak of valves, because in small shops where the work has to be rushed out quickly, and other conditions prevent the material being made up in stock, the valve body may be turned up, the seats faced, and the whole thing finished up, tested and shipped before the casting has readjusted itself to the new conditions, brought about by removing a portion of the skin, and the valve may go out as a perfect valve before the shrink strains have been fully released. The result is that no matter how carefully the valve is made, it will not be tight when put into use

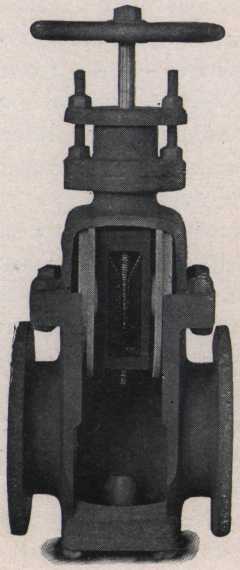


Fig. 59.

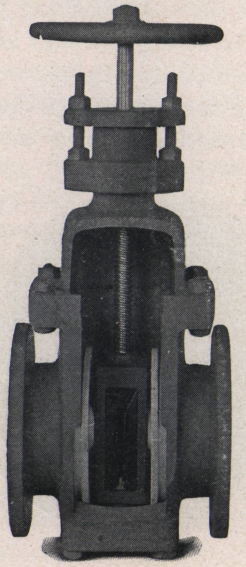


Fig. 60.

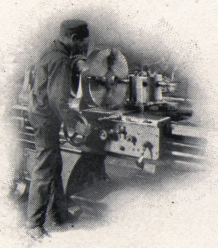


Fig 61.

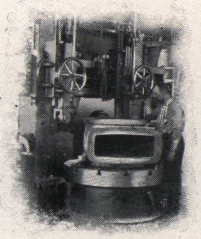


Fig. 62.

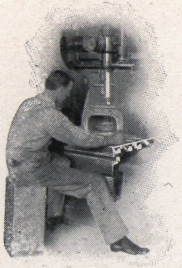


Fig. 63.

for the reason that if it was tight to begin with, it certainly cannot be after it has warped. These shrink strains are the conditions of tension in different parts of the casting, due to the fact that one part may cool faster than another part resulting in anequality of shrinkage, and the outside skin of the casting being the toughest portion and first cooled, holds the balance of casting in shape against the slight distortion which would result from the unequality of cooling on account of the varying thickness of the different parts.

Fig. 64.

This matter of shrink strains has always received very careful attention in our shops, particularly in case of valves, for as we make up large quantities of valves for stock, and therefore have the advantage of being able to have the preliminary work done on the castings which are then laid aside for a time for the shrink strains to adjust themselves after which the finishing is done, with the assurance that the valves will remain in perfect condition in which they are finished. These remarks also apply, of course, to gates as well as the valve bodies,

Cleaning holes are provided on valves larger than 10 inch so that the interior of the valve body is always accessable when the valve is closed, as our valve mechanism is such that when the valve is firmly closed, the gates are locked in position and the cleaning hand hole plate may be removed, and also the cap or upper portion of valve body may be entirely removed by simply taking out the flange bolts and running the

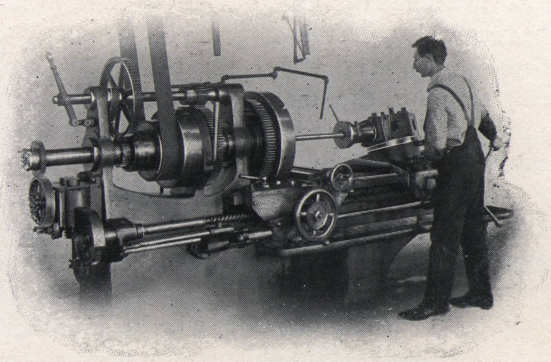


Fig. 65.

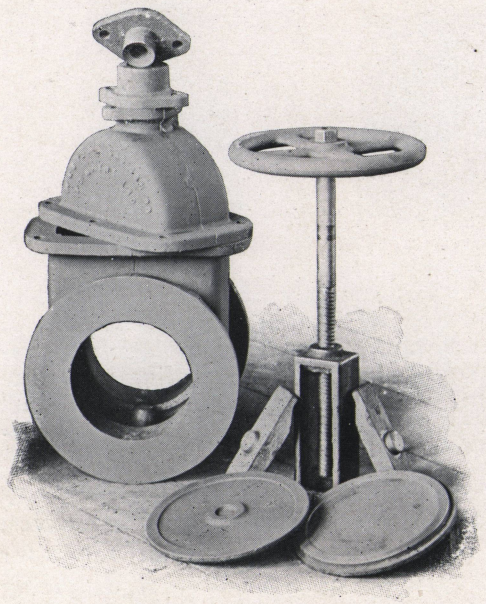


Fig. 66.

screw up out of the nut in the gate yoke; this being very clearly illustrated in Figure 64.

Figures 1 to 7 inclusive, shows the details of the locking device for the gates, being an exact reproduction of the patent office drawing; this mechanism having been patented by us July 6th, 1897, long before the advent of one of our competitors who in their appreciation of good construction have endeavored to copy our valves throughout, but those of our customers who have tried them have returned to us in every case we are aware of.

By examining the different cuts illustrating the locking device for our valve gates, it will be seen that the valve cannot stick, although they can be relied upon to close tightly and can be tested while in use by merely closing the gates, venting the valve case on the side, and in applying a pressure gauge, when if there be any leak of either gate, the gas escaping into the valve case will cause the pressure to rise; the degree of the leak being indicated by the rapidity of rise of the pressure.

In our large valves regularly, and in any size upon order a removable bushing is provided in the head of the gate yoke through which the stem works, so that a new stem and new bushing can be inserted without removing the valve from the line, or putting it out of service other than that it be closed while the change is made. Our valves are made on the interchangeable plan so that there is no time lost in renewing any part, and being assured of a fit.

HOW TO ORDER VALVES.

In Purchasing Valves, it is necessary that certain data be incorporated in the order for the information of the manufacturer, in order to be assured that he will understand exactly what is required if anything is called for other than the regular hub or flange valve.

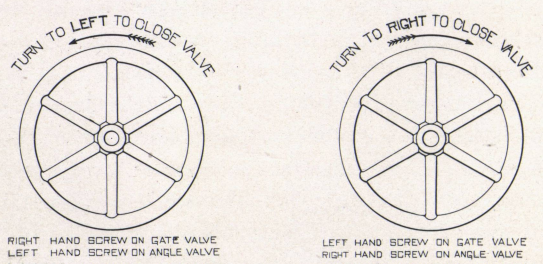

TURN TO LEFT TO CLOSE VALVE
RIGHT HAND SCREW ON GATE VALVE
LEFT HAND SCREW ON ANGLE VALVE
LEFT HAND VALVE
TURN TO RIGHT TO CLOSE VALVE
LEFT HAND SCREW ON GATE VALVE
RIGHT HAND SCREW ON ANGLE VALVE
RIGHT HAND VALVE

Fig. 67.

1. Diameter of pipe.
2. Style of connection, whether flange, hub, screw or universal.
3. Whether inside or outside screw is required; inside screw meaning valve of the type shown in Figure 14, and outside screw being of the type shown in

Figure 20. If outside screw is desired, state type of nut, that is whether plain or with sleeve, and if inside screw is desired, state whether single screw or compound; the single screw being shown in Figure 11 and compound in Figure 19.

Also state whether valve is wanted Right or Left hand, and to be sure about this remember that a Right hand valve closes when the hand wheel is turned as the hands of a clock move, as will be seen by reference to Fig. 67, which applies to all but geared valves, because the gearing reverses the action of the screw and consequently a Right hand geared gate valve will have Right hand screw.

4. If floor stands are to be used, state the style of floor stand desired, and the distance from top surface of floor to center line of pipe. Distance braces being always provided for floor stands unless other special provision is made. If floor stands are required be careful in specifying the style of floor stands.

5, If flanged valves are called for, be careful to state outside diameter of flange, with diameter of bolt circle and number, size and arrangement of bolts, for *unless this be specified*, flanged valves will always be sent with the flange and drilling in accordance with AMERICAN GAS LIGHT ASSOCIATION STANDARD. It is fully sufficient in locating the bolts, to state the size of the flange, diameter of bolt circle, size of bolt, and number of bolts, and whether bolts are on straddle center line. By *center line* is meant the line drawn across the face of the flange through the center of the flange, and exactly parallel to the stem of valve.

Unless otherwise ordered right hand valves will always be sent, that is to say valves will close by turning the hand wheel in the same direction as the hands of a clock. Figure 67 will illustrate this matter clearly so that there shall be no mistake in ordering. If geared gate valves are used, then in a right hand valve there will be a right hand screw instead of left hand screw, because the action of the gearing reverses the direction of the screw when operating, but a right hand valve always closes by turning the wheel to the right. Flanges and hubs for spigots, or universal hubs may be applied to all inside screw valves, all outside screw valves, all quick opening valves, excepting hot gas valves Angle valves and automatic by-pass valves are in nearly all instances supplied with flanges, and if it is desired to connect to spigot pipe, flanged hub pieces are employed as shown by Figure 10. Hot gas valves are all supplied with flanges. A hand wheel or nut head is optional on inside screw and inside compound screw, also district testing valves at the same price.

Gear head, bevel or spur gears, with either hand wheel or nut head may be applied to inside screw and inside compound screw valves 30 inches and larger and bevel geared head may be applied to outside screw valves.

Universal hubs, standard for connecting the Central Foundry Company's Universal Pipe may be substituted for ordinary faced and drilled flanges at the same price on any valve, excepting those for hot gas.

Floor stands may be applied to any style of valve.

Hydraulic lifts may be applied to any style of valve 20 inches or larger, excepting of course automatic by-pass valves.

Protecting sleeve or telescoping sleeve may be applied to any style of outside screw valve having "A" style of yoke. Hot gas valves are always made of the quick opening type.

When it is desired that a valve shall connect to existing work, of which the proper template cannot be given, or in case where there is doubt about the template for drilling the valve, same should be ordered, *"Flanges not drilled,"* in order that the purchaser may drill them to fit when connecting. Flanged valves are recommended wherever possible for use throughout the works, in order to avoid any possibility of springing a valve by careless caulking when making a hub joint, and also for the great advantage it affords in removing the valves from the line without disturbing other connections. In the case of compound screw valves the wheel and screw rise a distance about equal to half the diameter of the pipe, when valve is opened.

Angle valves may be supplied with "A" yoke or arch yoke as desired, although the arch yoke is recommended in preference to the other, being much neater and more compact, and in every way satisfactory.

In the following tables we give the principle dimensions of valves for Engineers use in laying out work and also price list of standard valves carried in stock. *In ordering to get our best prices on valves for your work, send us a list of the number, sizes and styles required and get our most favorable quotation.*

CLAIMS ALLOWED IN PATENT No. 585,912.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a gate-valve, the combination with a yoke having openings or sockets in its opposite faces, of gibs loosely fitting in the outer faces of said yoke and each having a portion projecting through said openings into the interior of the yoke, the said projecting portion being provided with inclined faces on the interior thereof, a wedge secured to the valve-casing and adapted to engage the said inclined faces of the gibs and force them outward, and a valve-disk connected to each gib by a central journal-and-socket connection, substantially as and for the purpose set forth.

2. In a gate-valve, a yoke having openings in its opposite faces and a stem connecting with the yoke, in combination with lateral movable gibs loosely fitting in the openings of the yoke and having interior inclined surfaces at their lower ends, a removable bottom plate having a conical wedge adapted to bear upon the inclined surfaces of the gibs, and valve-disks loosely connecting with the gibs, by journal-and-socket connections, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

OLAF N. GULDLIN.

Witnesses:
PERRY A. RANDALL,
CHARLES E. REED.

DIMENSIONS.

ALL IN INCHES.

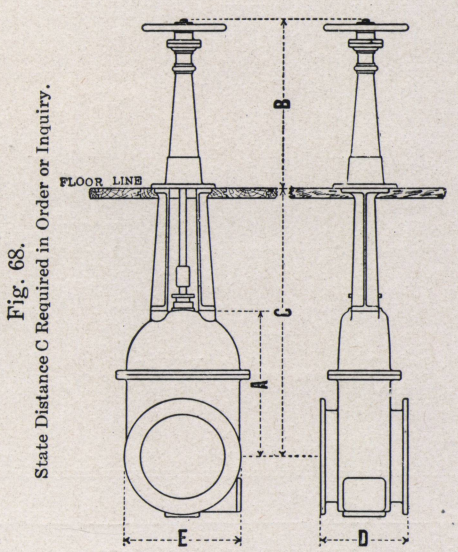


Fig. 68.
State Distance C Required in Order or Inquiry.

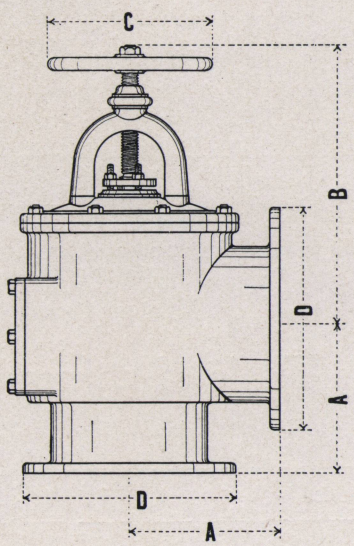


Fig. 69.

FLOOR STAND VALVES.

Fig 68, Dimensions.	8	10	12	14	16	20	24	30	36	42
Ctr. Valve to braces, A	15	17½	21	25⅝	27⅝	33½	39½	50½	56½	68
Stand high over all, B	32	32	33	33	33	33	33	39	39	39
Center to top of floor, C	27	30	30	36	39	45	56	66	71½	83
NOT LESS THAN Face to face of flanges *D	11	13¾	14⅝	16	16⅜	19	20	22	24	26
Dia. of flanges *E	13	16	18	20	22½	27	31	37½	43½	50
Thickness of flanges	¾	¾	⅞	⅞	⅞	1⅛	1⅛	1¼	1¼	1¼
Bolt circle	11⅛	13¾	15¾	17¾	20	24½	28½	35	41	47
Number of holes	8	8	8	8	12	16	16	20	24	28
Size of holes	¾	¾	¾	¾	⅞	⅞	⅞	1	1	1

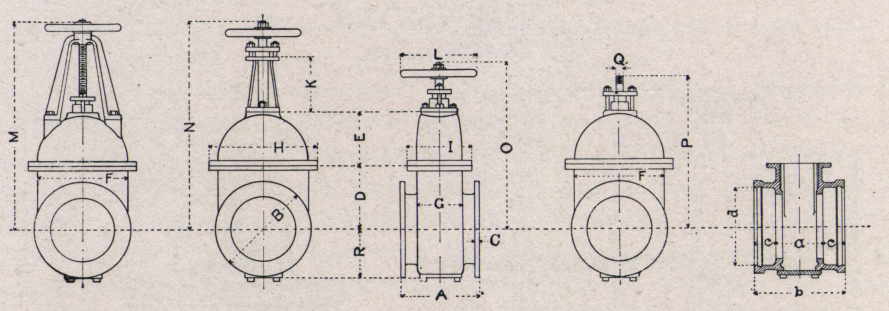
HOLES STRADDLE CENTER LINES

ANGLE VALVES.

Fig. 69, Dimensions.	6	8	10	12	16	20	24
Center to Face *A	6¾	8¾	10¼	12¾	16¾	20¾	22
(When Valve Closed) B	17	20	23	24	31	34	40
Dia. of Wheel C	10	12	14	14	16	20	20
Diam. of Flanges *D	11	13	16	18	22½	27	31
Thickness of Flanges	⅝	¾	¾	⅞	⅞	1⅛	1⅛
Bolt Circle	9½	11⅞	13¾	15½	20	24½	28⅝
No. of Holes	4	8	8	8	12	16	16
Size of Holes	¾	¾	¾	¾	⅞	⅞	⅞

HOLES STRADDLE CENTER LINES.

*These dimensions can be changed for special orders. Flanges will be drilled special if stated in order.



OUTSIDE SCREW. LIST NO. 2. | COMPOUND SCREW. LIST NO. 3. | SINGLE SCREW. LIST NO. 1. | QUICK OPENING. LIST NO. 4. | HUB VALVE BODY.

(LIST MEANS PRICE LIST, SEE SUPPLEMENT.)

Table of Dimensions of Standard Valves.

ALL DIMENSIONS IN INCHES.

SIZE.	3	4	6	8	10	12	14	16	18	20	24	30	36	42
A†	8 3/8	10	11	11	13 3/4	14 5/8	16	16 3/8	18	19	20	22	24	26
B	7 5/8	9	11	13	16	18	20	22 1/2	24	27	31	38 1/2	43 1/2	50
C	1/2	5/8	5/8	3/4	3/4	7/8	7/8	7/8	7/8	1 1/8	1 1/8	1 1/4	1 1/4	1 1/4
D	4	4 3/4	6 3/4	8 3/4	10	12	13 3/4	15 1/2	16 3/4	18	21 1/2	26	30	33
E	3 5/8	5 1/8	6 1/4	8	9 1/4	10	11 1/4	12 5/8	14 1/4	16 7/8	18 3/4	24 1/2	27 1/4	36
F	6 1/4	7 3/4	9 7/8	11 3/4	14	16 3/4	19 3/8	21 3/8	23 1/2	25 5/8	30	37	44	52
G	4 3/8	5 1/4	6 3/8	6 1/2	7 1/2	8 1/2	9 1/4	9 7/8	10 1/4	10 5/8	12 1/8	14 1/2	16 1/2	15 7/8
H	8 1/4	10	13	14 3/4	17 1/2	20 1/4	23 1/4	25 1/4	27 3/8	29 1/2	33 7/8	41	49	56
I	6 3/8	7 1/2	9 1/2	9 1/2	11	12	13 1/8	13 3/4	14 1/4	14 1/2	16	18 1/2	21 1/2	21 1/2
K	.....	.....	.....	8 3/8	9 1/2	10 1/2	11 1/2	12 3/4	13 3/4	14 3/4	.....	.....	.....	.....
L	7 1/2	10	10	12	12	14	16	16	18	20	20	24	30	30
M	.....	.....	.....	30 1/2	34 3/4	43	48	51 3/4	57 3/8	63	73 1/2	89	103	.....
N	.....	.....	.....	31 1/4	34 3/4	38 3/4	43	47	53	58	64 1/2	.....	.....	.....
O	15	17 1/3	21 1/2	25 1/4	28	30 3/4	34 1/4	37	41	46 1/4	51 1/2	62	70	81
P	.....	15 1/8	20	23 3/4	25 3/4	28 3/4	31 1/2	34	.....	.....	.....	.....	.....	.....
Q*	3/8	3/4	3/4	3/4	1	1	1	1	.....	.....	.....	.....	.....	.....
R	3 1/8	4 5/8	5 5/8	6 1/2	7 5/8	9 1/4	10 5/8	11 5/8	12 3/4	13 3/4	16	20	23 1/2	.....
a	5	6	6 1/4	6 1/2	7 5/8	8 3/4	10	10 1/2	10 1/2	10 5/8	12 1/8	14	17	.....
b	11	12	14 3/4	14 1/2	15 5/8	16 3/4	18	18 1/2	18 1/2	19 5/8	21 5/8	23 1/2	27	.....
c	3	3	4	4	4	4	4	4	4	4 1/2	4 3/4	4 1/8	5	.....
d	4 5/8	5 5/8	7 5/8	10	12 1/4	14 1/2	16 1/4	18 1/2	20 1/4	22 1/4	26 1/2	32 3/4	38 7/8	.....
Bolts, etc. Dia. cir	5 5/8	7 1/8	9 1/8	11 1/8	13 3/4	15 3/4	17 3/4	20	21 3/4	24 1/2	28 1/2	35	41	47
Bolts, etc. No. holes	4	4	4	8	8	8	8	12	12	16	16	20	24	28
Bolts, etc. Size holes	5/8	3/4	3/4	3/4	3/4	3/4	3/4	7/8	7/8	7/8	7/8	1	1	1
Bolts, etc. Size bolts	1/2	5/8	5/8	5/8	5/8	5/8	5/8	3/4	3/4	3/4	3/4	7/8	7/8	7/8

All bolt holes straddle centers.

†A, distance can be widened or narrowed if required.

*Q is size of gas pipe thread, on Quick Opening Valve Stem.

IMPORTANT.—Where any valve is to be operated by a Floor Stand, see Page 19.

Supplement will follow giving List Prices, also Telegraph Code Words for different styles and sizes of Valves.